



Organic Green Beans for the Export Market

IPM CRSPprogress

Growers in Mali have a new, pesticide-free package of technologies for green bean production. IPM CRSP researchers borrowed the use of sticky traps from research trials seen in Guatemala and neem extracts from an exotic tree imported from India. This package is being disseminated through Farmer Field Schools animated by IPM CRSP trained extension agents.

Fresh, "extra fine" green beans (*Phaseolus vulgaris*) are a delicacy in France, particularly during the holiday season when it is too cold for their production in Europe. At this time, high quality green beans earn a premium on the market. In order to serve this market, green bean production was introduced to Mali during the 1970s. After two decades of difficulties establishing a market niche for



Malian green beans, the Malian currency (CFA Franc) was devalued in 1994. Consequently, Malian produce became relatively cheaper than imports from Kenya, the major off-season green bean producer. Malian exports increased from just over 61 tons per year in the 1997-98 growing season to almost 125 tons in 1999-2000. Green beans have provided the opportunity for many small farmers to become involved in periurban export.

Malian green bean producers are found around the periphery of Bamako. During the rainy season, most of these farmers grow cotton for sale to a parastatal, the *Office de la Haute Vallée du Niger* (OHVN), and food crops primarily for their own consumption. A small amount of food crops may be sold at local markets when crops are plentiful. During the off-season, they have been growing horticultural crops with variable success for additional cash income. Green bean production has varied over time, but has recently begun a new upsurge.



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Product quality is the key to successful exportation. There are three standards of product quality which horticultural exporters must meet. (1) There are the standards of appearance and taste which define the product itself. (2) Produce must not become the vector for importing exotic and invasive pests. (3) Standards of food safety must be met, primarily concerning pesticide residues.



The “extra fine” quality designation for fresh green beans requires that the beans be less than 9 mm in width (preferably less than 6 mm), tender, crisp, and without grains and defaults of form or color. Achieving these standards requires maintaining healthy plants and harvesting daily (at most every other day) over the productive period of six weeks. In order to assure delivery of a sufficient volume of quality green beans, exporting agents contract with villages of producers, providing them with seed, fertilizer, and pesticides (or pesticide spraying services). Some export agents have even provided watering cans as production incentives. These expenses are deducted from the grower’s payment after the end of the season.

The IPM CRSP is assisting Mali institutions in their green bean export program. The IPM CRSP is a United



States Agency for International Development (USAID) funded project which consists of a consortium of scientists from U.S. universities and host country institutions working collaboratively to (1) reduce agricultural losses due to pests, (2) reduce environmental contamination, and (3) increase food production and farmer income through the development and transfer of improved IPM technologies. To promote the production of green beans for export in Mali, the U.S. universities, Purdue, North Carolina A&T, Montana State and Virginia Tech are working collaboratively with the Malian institutions, *Institut d’Economie Rurale* (IER), the extension *Office de la*



Grading green beans for export



Haute Vallée (OHVN), the Environmental Toxicology Laboratory (ETL) of the Central Veterinary Laboratory (LCV), and the *Institut Supérieur de Formation et de Recherche Appliqué* (ISFRA) of the *Université de Mali*. This consortium is dedicated to the goal of providing



Green beans packed for export

nutritious food for Malians and helping farmers profit from the green bean export market.

Fresh green bean production is labor intensive with virtually all of the growing practices being conducted with animals or by manual labor. Of necessity, the production area for each farmer is rather small, ranging from 100 square meters to about 1 hectare. The general procedure is that all of the growers in a village will harvest beans simultaneously, on a two-day cycle over a period of about a month. The exporter collects, sorts and



Neem tree,
leaves and fruit



Crushed neem
leaves and extract



Extracting neem oil from leaves

packages the harvest every two days from collection centers in the participating villages, and delivers them to the airport in Bamako. The green beans are then transported to Paris, France via commercial airliner.

Pests (weeds, insect and diseases) are major constraints to production, with losses up to 50%. To minimize losses due to pests, green bean farmers often use pesticides. However, European consumers have high levels of concern regarding the potential harmful effects of pesticide residues in food. Thus, one way that Malian green bean growers can maintain or increase their exports to Europe is by reducing as much as possible the amount of pesticide residues on the harvested beans. The IPM CRSP program in Mali is thus developing alternative control methods to eliminate or at least minimize pesticide residues on green beans exported to Europe.

The IPM CRSP team has developed a way to produce green beans which is pesticide-free. The integrated crop management (ICM) package for the production of green bean includes (1) planting of high yielding, high quality and pest resistant varieties, (2) well decomposed compost for soil fertility, (3) soil solarization to control plant diseases, (4) sticky traps to capture insects, (5) manual removal of weeds, and (6) neem extracts to control insects.

The neem tree (*Azadirachta indica*), sometimes referred to as “a miracle plant” has been used for many different purposes for 4500 years and is an exotic tree widely grown in West Africa today. Neem extracts were used in traditional (village-practiced) IPM due to economic



Farmer training in green bean IPM



Green bean biocontrol studies



necessity and are now being use as an alternative to chemical insecticides. Neem extract poses no known danger to humans nor most natural enemies of green bean pests. Neem extracts are prepared by farmers by grinding neem leaves in a traditional African mortar and pestle. The neem extract produced is sprayed on to the plants and acts as an anti-feedant to insects.

An economic analysis of IPM packages in green bean production indicated that the use of insect traps was far superior to the farmers' normal practice (three applications of Decis, chemical fertilizer and organic fertilizer). On the average, this IPM technology yielded \$2221 per hectare of green beans produced, compared to \$1,353 per hectare for the farmer's practice. Furthermore, the potential for an added premium for "organically-grown" green beans would encourage farmers to switch from



Pesticide-free green beans

applying either a single dose or double dose of Decis to the use of insect traps. For every additional dollar invested in the switch, the use of insect traps will yield \$4.03 and \$1.62, respectively. Market research has determined that an export market for "organically" grown green beans could be developed. The IPM package for growing green beans "organically" has been disseminated to over 700 men and women farmers in 21 villages of the Upper Niger Valley production zone of Ouelessebouyou through Farmer Field Schools.



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